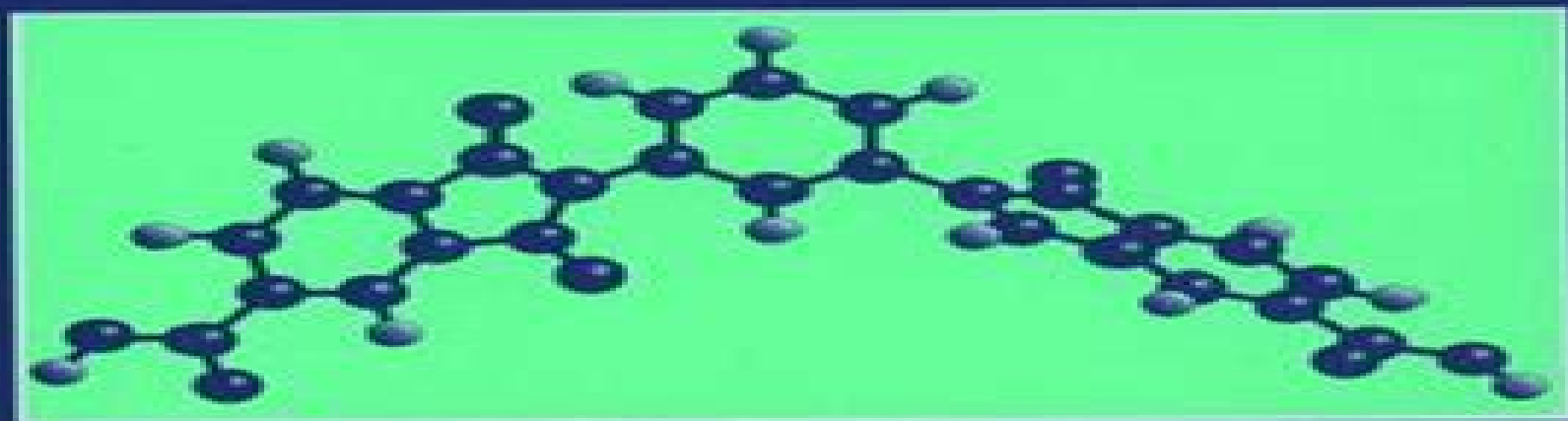


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Polymer Membranes for Gas and Vapor Separation

Chemistry and Materials Science



EDITED BY

B. D. Freeman and I. Pinnau

Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science

Yuri Yampolskii, E. Finkelshtein



Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science:

Materials Science of Membranes for Gas and Vapor Separation Benny Freeman, Yuri Yampolskii, Ingo Pinnau, 2006-05-12

Materials Science of Membranes for Gas and Vapor Separation is a one stop reference for the latest advances in membrane based separation and technology Put together by an international team of contributors and academia the book focuses on the advances in both theoretical and experimental materials science and engineering as well as progress in membrane technology Special attention is given to comparing polymer and inorganic organic separation and other emerging applications such as sensors This book aims to give a balanced treatment of the subject area allowing the reader an excellent overall perspective of new theoretical results that can be applied to advanced materials as well as the separation of polymers The contributions will provide a compact source of relevant and timely information and will be of interest to government industrial and academic polymer chemists chemical engineers and materials scientists as well as an ideal introduction to students

Polymer Membranes for Gas and Vapor Separation Benny D. Freeman, 1999 This book is based on the proceedings of the Chemistry and Materials Science of Synthetic Membranes Symposium in 1997 and includes contributions from scientists working in 18 different countries It focuses on tailoring separation properties and control of porous membrane formation An introductory chapter is followed by 22 articles discussing a range of topics including free volume in polymeric membrane materials facilitated transport membranes group contribution modeling of gas transport in polymeric membranes and Indan containing polymers for gas separation membranes Distributed by Oxford U Press Annotation copyrighted by Book News Inc Portland OR

[Transport Properties of Polymeric Membranes](#) Sabu Thomas, Runcy Wilson, Anil Kumar S, Soney C. George, 2017-11-20

Transport Properties of Polymeric Membranes is an edited collection of papers that covers in depth many of the recent technical research accomplishments in transport characteristics through polymers and their applications Using the transport through polymer membranes method leads to high separation efficiency low running costs and simple operating procedures compared to conventional separation methods This book provides grounding in fundamentals and applications to give you all the information you need on using this method This book discusses the different types of polymer their blends composites nanocomposites and their applications in the field of liquid gas and vapor transport Some topics of note include modern trends and applications of polymer nanocomposites in solvent vapor and gas transport fundamentals and measurement techniques for gas and vapor transport in polymers and transport properties of hydrogels This handpicked selection of topics and the combined expertise of contributors from global industry academia government and private research organizations make this book an outstanding reference for anyone involved in the field of polymer membranes Presents current trends in the field of transport of liquid gas and vapor through various polymeric systems Features case studies focused on industrial applications of membrane technology along with fundamentals of transport and materials Helps readers quickly look up a particular technique to learn key points capabilities and

drawbacks Nanostructure Control of Materials R H J Hannink,A J Hill,2006-02-28 The ability to measure and manipulate matter on the nanometer level is making possible a new generation of materials with enhanced mechanical optical transport and magnetic properties This important book summarises key developments in nanotechnology and their impact on the processing of metals polymers composites and ceramics After a brief introduction a number of chapters discuss the practical issues involved in the commercial production and use of nanomaterials Other chapters review ways of nanoengineering steel aluminium and titanium alloys Elsewhere the book discusses the use of nanoengineered metal hydrides to store hydrogen as an energy source and the development of nanopolymers for batteries and other energy storage devices Other chapters discuss the use of nanotechnology to enhance the toughness of ceramics the production of synthetic versions of natural materials such as bone and the development of nanocomposites Nanostructure control of materials is an ideal introduction to the ways nanotechnology is being used to create new materials for industry It will be welcomed by R D managers in such sectors as automotive engineering as well as academics working in this exciting area Reviews key developments in nanotechnology and their impact on various materials Edited by leading experts in the field *Membrane Materials for Gas and Separation* Yuri Yampolskii,E. FInkelshtein,2017-01-10 Si containing polymers have been instrumental in the development of membrane gas separation practices since the early 1970s Their function is to provide a selective barrier for different molecular species where selection takes place either on the basis of size or on the basis of physical interactions or both Combines membrane science organosilicon chemistry polymer science materials science and physical chemistry Only book to consider polymerization chemistry and synthesis of Si containing polymers both glassy and rubbery and their role as membrane materials Membrane operations present environmental benefits such as reduced waste and recovered recycled valuable raw materials that are currently lost to fuel or to flares **Imidic Polymers and Green Polymer Chemistry** Andreea Irina Barzic,Neha Kanwar Rawat,A. K. Haghi,2021-03-25 This book reviews the latest research development and future potential of polyimides and green polymer chemistry It combines the major interdisciplinary research in this area Polymers with imidic structure known as polyimides are widely investigated owing to their practical implications in numerous industrial sectors The book explains why polyimides offer versatility unparalleled in comparison to most other classes of macromolecules In addition developments in green polymer chemistry in this area have been stimulated by health and environmental concerns interest in sustainability desire to decrease the dependence on petroleum and opportunities to design and produce green products and processes Major advances include new uses of green processing methodologies and green polymeric products Imidic Polymers and Green Polymer Chemistry New Technology and Developments in Process and Product is targeted to scientists engineers and students who are involved or interested in green polymer chemistry and imidic polymers This book will serve as a valuable reference for those with an interest in synthesis of polyimides and the chemistry and physical chemistry of polyimide compounds Advanced Membrane Technology and Applications Norman N

Li,Anthony G. Fane,W. S. Winston Ho,Takeshi Matsuura,2011-09-20 Advanced membranes from fundamentals and membrane chemistry to manufacturing and applications A hands on reference for practicing professionals Advanced Membrane Technology and Applications covers the fundamental principles and theories of separation and purification by membranes the important membrane processes and systems and major industrial applications It goes far beyond the basics to address the formulation and industrial manufacture of membranes and applications This practical guide Includes coverage of all the major types of membranes ultrafiltration microfiltration nanofiltration reverse osmosis including the recent high flux and low pressure membranes and anti fouling membranes membranes for gas separations and membranes for fuel cell uses Addresses six major topics membranes and applications in water and wastewater membranes for biotechnology and chemical biomedical applications gas separations membrane contractors and reactors environmental and energy applications and membrane materials and characterization Includes discussions of important strategic issues and the future of membrane technology With chapters contributed by leading experts in their specific areas and a practical focus this is the definitive reference for professionals in industrial manufacturing and separations and research and development practitioners in the manufacture and applications of membranes scientists in water treatment pharmaceutical food and fuel cell processing industries process engineers and others It is also an excellent resource for researchers in industry and academia and graduate students taking courses in separations and membranes and related fields

Membrane Technology and Applications Richard W. Baker,2012-10-01 the best handbook on membrane technology which is currently on the market Membrane News on the previous edition Building on the success of the previous edition Membrane Technology and Applications Third Edition provides a comprehensive overview of separation membranes their manufacture and their applications Beginning with a series of general chapters on membrane preparation transport theory and concentration polarization the book then surveys several major areas of membrane application in separate chapters Written in a readily accessible style each chapter covers its membrane subject thoroughly from historical and theoretical backgrounds through to current and potential applications Topics include reverse osmosis ultrafiltration pervaporation microfiltration gas separation and coupled and facilitated transport chapters on electrodialysis and medical applications round out the coverage NEW TO THE THIRD EDITION New sections on the use of membranes in the chlor alkali industry membrane distillation pressure retarded osmosis and constant flux variable pressure ultrafiltration Zeolite and ceramic membranes submerged membrane modules and fuel cell membranes Substantially enhanced chapters on ultrafiltration pervaporation and membrane contactors Updates to every chapter to reflect the developments in the field

Functional Nanostructured Membranes Enrico Drioli,Lidietta Giorno,Annarosa Gugliuzza,2018-12-07 A membrane is considered the heart of every separation process because it is developed as a nanostructured nanofunctionalized thin barrier that controls the exchange between two phases not only by external forces and under the effect of fluid properties but also through the intrinsic characteristics of the

membrane material itself This book compiles cutting edge research in membrane science nanomaterials and nanotechnologies mainly from interdisciplinary research groups at the Institute on Membrane Technology National Research Council ITM CNR Italy working on membrane design membrane process engineering and selected materials and practices for enhanced transport mass charge and energy It covers topics on the design of new nanostructured membranes with improved properties together with the identification of efficient transport property relationships It shares and strengthens the knowledge of making membrane technology a much more powerful and eco friendly route enabling one to provide prospective solutions and benefits for numerous fields of applications where traditional separation technologies suffer from many deficiencies It is a great reference for researchers and investigators graduate PhD and postgraduate students and end users interested in membrane science and technology nanomaterials eco friendly separation chemistry biology and process engineering

Recent Advances in Polymer Nanocomposites: Synthesis and Characterisation Sabu Thomas, Gennady Zaikov, Valsaraj, Meera, 2010-08-03 This book examines the current state of the art new challenges opportunities and applications in the area of polymer nanocomposites Special attention has been paid to the processing morphology structure property relationship of the system Various unresolved issues and new challenges in the field of polymer nanocomposites are discussed The infl

Assessment of Potential Energy Savings in Fluid Separation Technologies, 1984

Nano-Enhanced and Nanostructured Polymer-Based Membranes for Energy Applications Maria Giovanna Buonomenna, 2022-01-22 There is a growing need for better membranes in several emerging application fields especially those related to energy conversion and storage as well as to water treatment and recycling Processability is an important functional property often ignored especially in the early discovery phase for new materials but it should be one of the most important properties that needs to be considered in the development of better membrane materials Useful membrane materials have to be capable of being formed into thin membranes in particular for membrane gas separation water treatment and desalination and then packaged into large area membrane modules All gas separation membranes that are in current commercial use are based on polymers which are solution processable This book intends to deal with composite in most cases hybrid polymer based membranes for three separate application fields energy conversion energy storage and water treatment and recovery Each chapter will explain clearly the various membrane processes then go on to discuss in detail the corresponding advanced membranes used The logic that lies behind this is that you have to understand the process in order to develop new high performance membranes By taking this approach the author aims to overcome the disconnection that currently exists between membrane materials scientists and industrial process engineers Discusses interdisciplinary content by a single author approaching synthesis and development of materials from the perspective of their processability Describes the novel aspects of membrane science that is related to energy storage conversion and wastewater treatment Presents an emphasis on scientific results which have an impact on real applications in terms of renewable and clean energy challenges

Biopolymer Grafting:

Synthesis and Properties Vijay Kumar Thakur, 2017-09-27 Biopolymer Grafting Synthesis and Properties presents the latest research and developments in fundamental of synthesis and properties of biopolymer based graft copolymers The book presents a broad overview of the biopolymer grafting process along with trends in the field It also introduces a range of grafting methods which lead to materials with enhanced properties for a range of practical applications along with the positives and limitations of these techniques The book bridges the knowledge gap between the scientific principles and industrial applications of polymer grafting This book covers synthesis and characterization of graft copolymers of plant polysaccharides functional separation membranes from grafted biopolymers and polysaccharides in alternative methods for insulin delivery Recent trends and advances in this area are discussed assisting materials scientists and researchers in mapping out the future of these new green materials through value addition to enhance their use Introduces polymer researchers to a promising rapidly developing method for modifying naturally derived biopolymers Provides a one stop shop covering synthesis properties characterization and graft copolymerization of bio based polymeric materials Increases familiarity with a range of biopolymer grafting processes enabling materials scientists and engineers to improve material properties and widen the range of potential biopolymer applications

Gas Transport in Glassy Polymers Maria Grazia De Angelis, Giulio C. Sarti, 2021-04-22 This Special Issue of Membranes focuses on several new aspects of fluid transport in glassy polymers with application in relevant membrane separations such as gas purification VOC removal and CO₂ capture In particular the focus lies on novel experimental techniques and detailed characterization of specific phenomena like polar and multicomponent interactions during transport The properties of novel materials such as mixed matrix membranes based on glassy polymers and different selective fillers are also presented A critical review of existing modeling approaches to describe the sorption and transport in glassy polymers suitable for membrane separations is provided including both macroscopic and atomistic models and relying both on the standard solution diffusion process and on the facilitated transport mechanism

Physical Chemistry for the Chemical and Biochemical Sciences Jose Luis Lopez-Bonilla, Marat Ibragimovich Abdullin, Gennady E. Zaikov, 2016-03-30 By providing an applied and modern approach this volume will help readers understand the value and relevance of studying case studies and reviews on chemical and biochemical sciences Presenting a wide ranging view of current developments in applied methodologies in chemical and biochemical physics research the papers in this collection all writ

Applied Polymer Science Ulf W. Gedde, Mikael S. Hedenqvist, Minna Hakkarainen, Fritjof Nilsson, Oisik Das, 2021-10-29 This companion volume to Fundamental Polymer Science Gedde and Hedenqvist 2019 offers detailed insights from leading practitioners into experimental methods simulation and modelling mechanical and transport properties processing and sustainability issues Separate chapters are devoted to thermal analysis microscopy spectroscopy scattering methods and chromatography Special problems and pitfalls related to the study of polymers are addressed Careful editing for consistency and cross referencing among the chapters high quality graphics worked out examples and numerous

references to the specialist literature make Applied Polymer Science an essential reference for advanced students and practicing chemists physicists and engineers who want to solve problems with the use of polymeric materials

Physical Chemistry Research for Engineering and Applied Sciences, Volume Two Eli M. Pearce,Bob A. Howell,Richard A. Pethrick,Gennady E. Zaikov,2015-04-01 This book presents some fascinating phenomena associated with the remarkable features of high performance polymers and also provides an update on applications of modern polymers It offers new research on structure property relationships synthesis and purification and potential applications of high performance polymers The collection of topics

Physical Chemistry Research for Engineering and Applied Sciences - Three Volume Set Eli M. Pearce,Bob A. Howell,Richard A. Pethrick,Gennady E. Zaikov,2015-06-24 This 3 volume set covers new research and applications on physical chemical for engineering and applied sciences Volume 1 discusses the principles and technological implications of industrial chemistry and biochemical physics Volume 2 presents some fascinating phenomena associated with the remarkable features of high performance polymers and also

Nanotechnology Applications in Environmental Engineering Nazir, Rabia,2018-08-03 Nanotechnology is the twenty first century revolution that has impacted each and every aspect of life despite its small size As nanoscale research continues to advance scientists and engineers are developing new applications for many different disciplines including environmental applications Nanotechnology Applications in Environmental Engineering contains innovative research on nanomaterials and their impact on the environment It also explores the current and potential future applications of nanodevices in environmental science and engineering showcasing how nanomaterials can be tailored to address some of the environmental remediation and sensing detection problems faced today While highlighting topics such as environmental science nanomaterials and membrane technology this book is ideally designed for environmental scientists nanotechnologists chemists engineers and individuals seeking current research on nanotechnology and its applications in environmental engineering

Comprehensive Membrane Science and Engineering Enrico Drioli,Lidietta Giorno,Enrica Fontananova,2017-07-20 Comprehensive Membrane Science and Engineering Second Edition Four Volume Set is an interdisciplinary and innovative reference work on membrane science and technology Written by leading researchers and industry professionals from a range of backgrounds chapters elaborate on recent and future developments in the field of membrane science and explore how the field has advanced since the previous edition published in 2010 Chapters are written by academics and practitioners across a variety of fields including chemistry chemical engineering material science physics biology and food science Each volume covers a wide spectrum of applications and advanced technologies such as new membrane materials e g thermally rearranged polymers polymers of intrinsic microporosity and new hydrophobic fluoropolymer and processes e g reverse electrodialysis membrane contractors membrane crystallization membrane condenser membrane dryers and membrane emulsifiers that have only recently proved their full potential for industrial application This work covers the latest advances

in membrane science linking fundamental research with real life practical applications using specially selected case studies of medium and large scale membrane operations to demonstrate successes and failures with a look to future developments in the field Contains comprehensive cutting edge coverage helping readers understand the latest theory Offers readers a variety of perspectives on how membrane science and engineering research can be best applied in practice across a range of industries Provides the theory behind the limits advantages future developments and failure expectations of local membrane operations in emerging countries

This book delves into Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science. Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science is a vital topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science, encompassing both the fundamentals and more intricate discussions.

1. The book is structured into several chapters, namely:
 - Chapter 1: Introduction to Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science
 - Chapter 2: Essential Elements of Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science
 - Chapter 3: Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science in Everyday Life
 - Chapter 4: Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science in Specific Contexts
 - Chapter 5: Conclusion
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3. In chapter 2, the author will delve into the foundational concepts of Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science. This chapter will elucidate the essential principles that must be understood to grasp Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science in its entirety.
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5. In chapter 4, the author will scrutinize the relevance of Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science in specific contexts. This chapter will explore how Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, this book will draw a conclusion about Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science. The final chapter will summarize the key points that have been discussed throughout the book. This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Polymer Membranes For Gas And Vapor Separation Chemistry And Materials Science.

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